TCA Handwipe Solvent Replacement

- New Handwipe Solvents Used at MDA-STL
  - Shopmaster RC, DS- 108F, PF Degreaser, and Brulin MP 1793
- Economics of New Solvents
  - TCA was $23/gal. in 1995
  - New Solvents Average Cost is $30/gal.
  - Usage of New Solvents is 1/3 of TCA Usage
  - Solvent Cost Reduced By ~ 50%
- TCA Usage Dropped from 140,000 lbs/yr ('93) to 1,000 lbs/yr ('96)

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Handwipe Solvents at MDA-STL

TYPE	CLASS	DESCRIPTION	SOLVENT
I	-	Used for gross cleaning, absolute cleanliness not required.	P-D-680, Type II
II	A	Used on Surfaces which shall be bonded. Vapor Pressure > 7 mm Hg and may be flammable.	Methyl Ethyl Ketone (MEK)
			Desoclean 45
II	B	Used on Surfaces which shall be bonded. Vapor Pressure < 7 mm Hg and shall not be flammable.	DS-108F
III	A	General cleaning where a high level of cleanliness is required (e.g. sealant applications. Vapor Pressure > 7 mm Hg and may be flammable.	MIL-C-38736, Type I
			Desoclean 45
III	B	General cleaning where a high level of cleanliness is required (e.g. sealant applications. Vapor Pressure < 7 mm Hg and shall not be flammable.	PF Degreaser
			DS-108F
			MP-1793
			Shopmaster RC
IV	-	Used for cleaning between applications of paint coatings.	Aliphatic Naptha (TT-N-95, Type II)
V	-	Used for stringent cleaning of electrical components.	MP 1793
			Isopropyl Alcohol (TT-I-735, Grade B)
VI	-	Used for general cleaning of electrical components.	MP 1793
			Isopropyl Alcohol (TT-I-735, Grade B)
VII	-	Used for cleaning prior to bonding with MMS 350, Type III bonding primer.	Hexane
VIII	-	Used to clean surfaces that shall be painted.	Methyl Ethyl Ketone (MEK)

Solvents Usage per MCS-6000, Revision B, 12 March 1997

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MEK Solvent Replacement

- MEK is Primarily Used in Paint Shop
  - 60% for Handwipe Cleaning to Prepare Parts for Painting
  - 40% for Cleaning Paint Equipment
- Solvent Distillation Being Developed to Recycle Spent MEK for Cleaning Paint Equipment
- Need MEK Replacement for Handwipe

MEK Handwipe Solvent Replacement

- Identify Uses
  - Part Cleaning Prior to Painting
- Identify Soils
  - Finger Prints, Ink, Wax, Oil, Grease, Silicone
- Identify Requirements
  - Paint Adhesion Testing
    - Several Paints Used at MDA-STL
      - Primers = FR, MIL-P-23377, MMS-423, MMS-436
      - Top Coats = MMS-420, MIL-C-27725, MIL-C-85285

MEK Handwipe Solvent Replacement

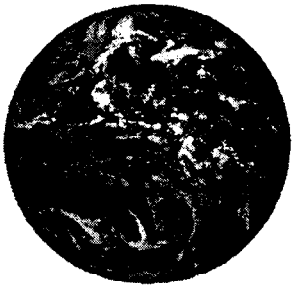
- Lab Tests of Solvent Candidates Included:
  - Cleaning Efficiency, Corrosion, NVR, Residue Stain, Dry Time, Flash Point, Vapor Pressure
- Odor is Also a Strong Test Criteria
  - Shop Workers Fill Out Evaluation Forms
- 28 Solvents Tested in Lab - Four Will Go On to Shop Trial
  - ARDROX 5564, Isoblast, MD-5 16F, DS-108F

MEK Handwipe Solvent Replacement

- Shop Trial of Four MEK Replacements Began in 1997
  - Met with Supervisors and Workers to Explain Shop Trial Effort
  - Each Solvent Will Be Tried for 2 to 4 Weeks in Each Area at MDA-STL
  - Shop Trial Will Be Completed in 1997
- Implementation Will Occur in 1998
  - Numerous Documentation Changes Required

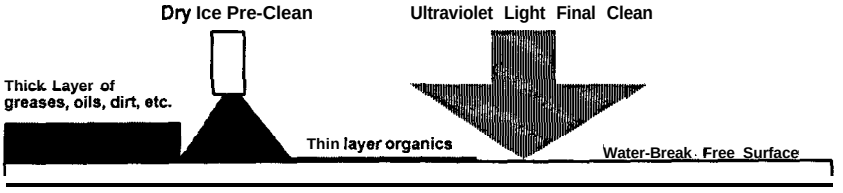
Dry Ice / Ultraviolet Light Cleaning

Solvent-Free, Water-Free Cleaning Process



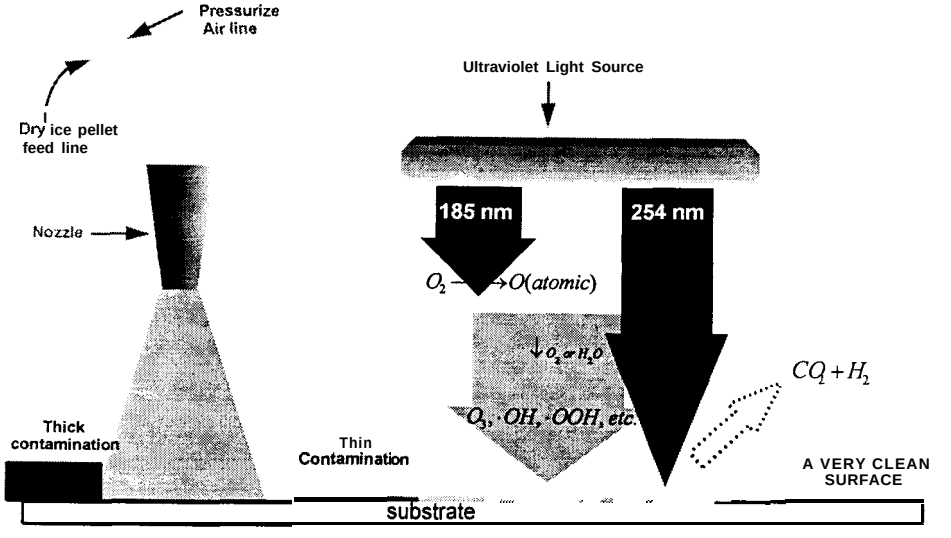
For a cleaner world

Process Overview



- First Step uses dry ice to remove the bulk of the contamination
- Second Step uses ultraviolet light to remove the last traces of organics from the surface.
- After cleaning, the surface is water-break-free. Surface analysis shows that this process cleans better than solvents.

Step 1: Dry Ice Preclean Step 2: Ultraviolet Light



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A solution in search of a problem...

- Regulations may tighten to the point that aqueous cleaners are not cost effective - i.e. if closed loop technology were to be required
- Applications where ULTRA-Clean surfaces are required or where conventional processing is not feasible
  - space hardware
  - optics
  - critical/difficult adhesion
  - Do you have any suggestions for applications?'?? If so, call Joan Deffeyes at 314-232-3866. SERDP contract covers investigation of new applications.

(For more information see: SAMPE Journal Vol. 33 No. 1 Jan/Feb 1997 pp. 58-83)

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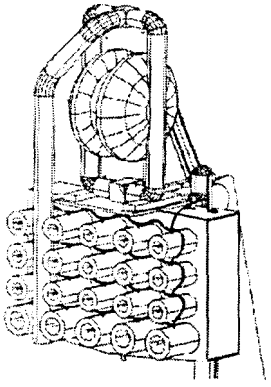
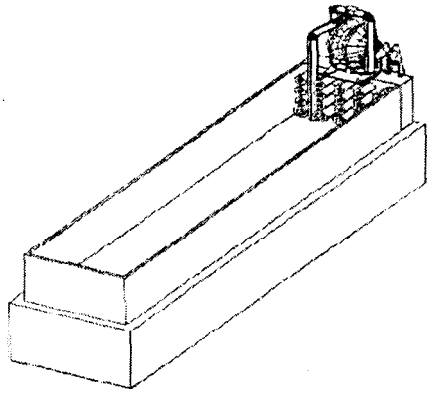
Tube Cleaning Equipment



Auto-Sizer Assembly



Auto-Sizer Installed in Process Tank

MDA Patented “Auto-Sizer” Tube Flushing Equipment

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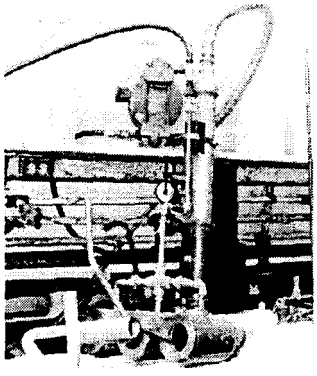
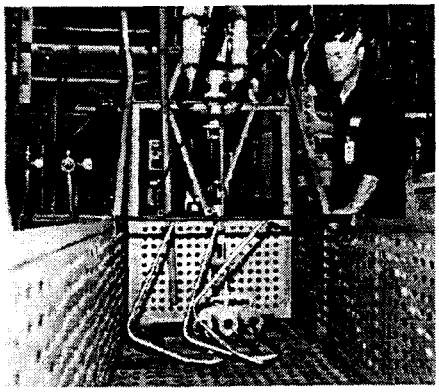
Tube Cleaning Equipment





Auto-Sizer Prototype in Test at MDA

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